

Can we use remote sensing to identify wetlands in Missouri??



•
•
•

WHAT IS SATELLITE REMOTE SENSING?

- Each object reflects or emits *electromagnetic radiation* (ER), depending on its physical characteristics.
- A sensor on a satellite collects this ER reflected from an object on the earth's surface.
- The *value* for the ER for an object is its “signature.”

•
•
•

WHY REMOTE SENSING?

- Collects large amounts of data at one time.
 - Some scenes may cover hundreds of ground miles!
- Collects data *in-situ*.
- Less expensive than areal photography or collecting field data.
- Data is “real-time”
- Data is collected at regular intervals
- Can perform analysis for multiple projects

-
-
-

Other Studies

- Jensen et al. (1995) used remote sensing to detect aquatic macrophyte changes in the everglades
- Coleman et al. Assessed wetlands in a national forest to aid in timber sales
- Sader et al. (1995) compared satellite imagery for forested wetlands in Maine.
- Lunetta and Balogh (1999) explored using imagery to aid in detection of jurisdictional wetlands in Maryland and Delaware.
- No such studies have been done in Missouri thus far

-
-
-

Wetland Image Analysis Project (WIAP)

- Develop a “cookbook” for other environmental professionals.
- We will use remotely sensed data and *attempt* to identify 4 types of wetlands:
 - Emergent
 - Shrub/scrub
 - Forested
 - Farmed

-
-
-

Matrix

- We will develop a matrix that evaluates various aspects of the platforms.
 - Cost
 - Resolution
 - Processing time
 - Image quality
 - Frequency of flight patterns
 - Number of bands
 - As well as many more.....

-
-
-

Emergent wetland



- Includes species such as: smartweed, lotus, cattails, bullrush, floating primrose, etc.

-
-
-

Shrub/scrub wetland



- Includes species such as black willow, sandbar willow, and cottonwood.

•
•
•

Forested wetland



- Evaluates riparian area forests
- Ancillary data may include soils and NWI maps.
- Includes species such as black willows, ash, and cottonwood

Farmed wetland



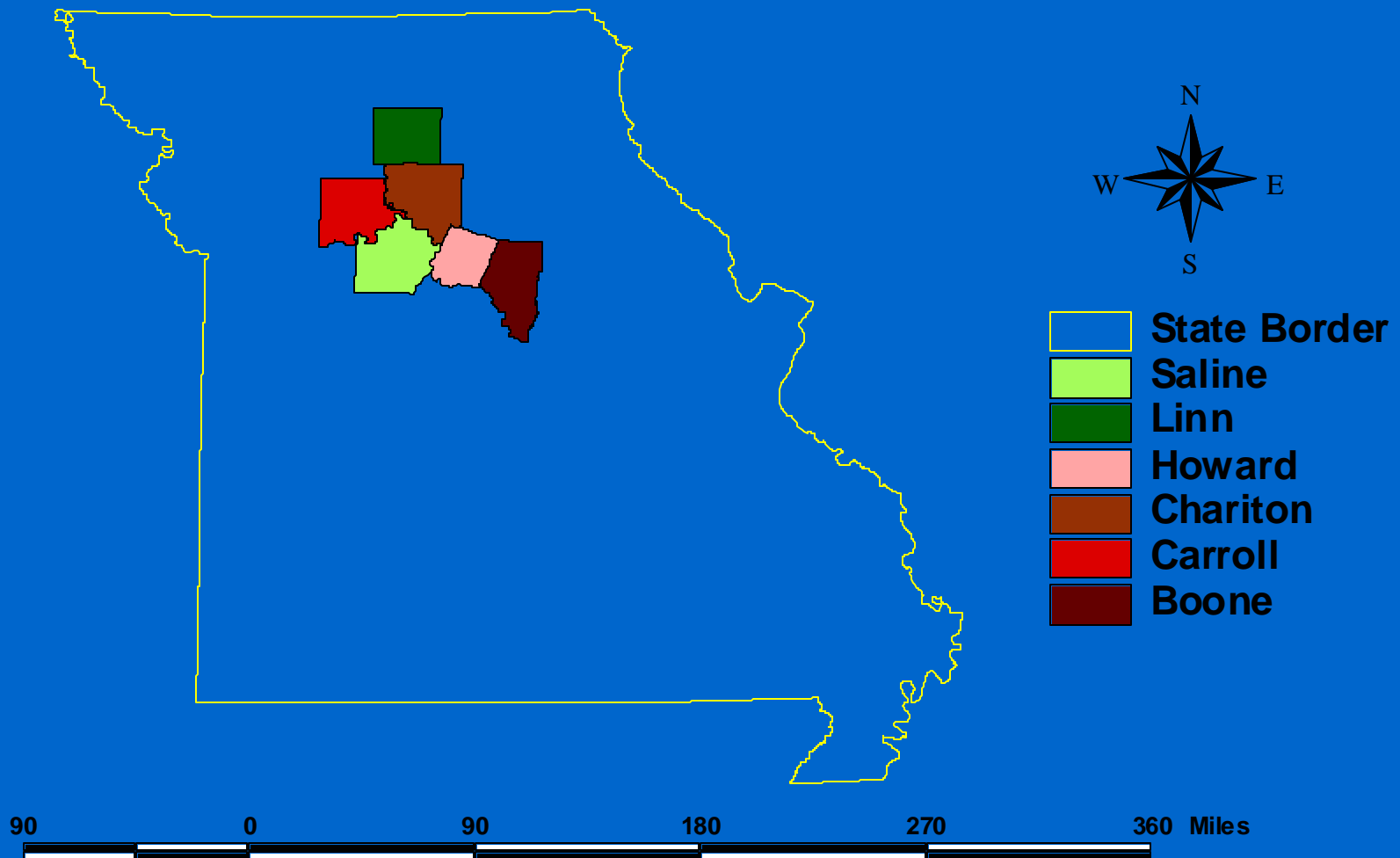
- Areas currently being used for row crops production.
- Will also use ancillary data such as NWI maps, soil maps, and TM 5 images.

•
•
•

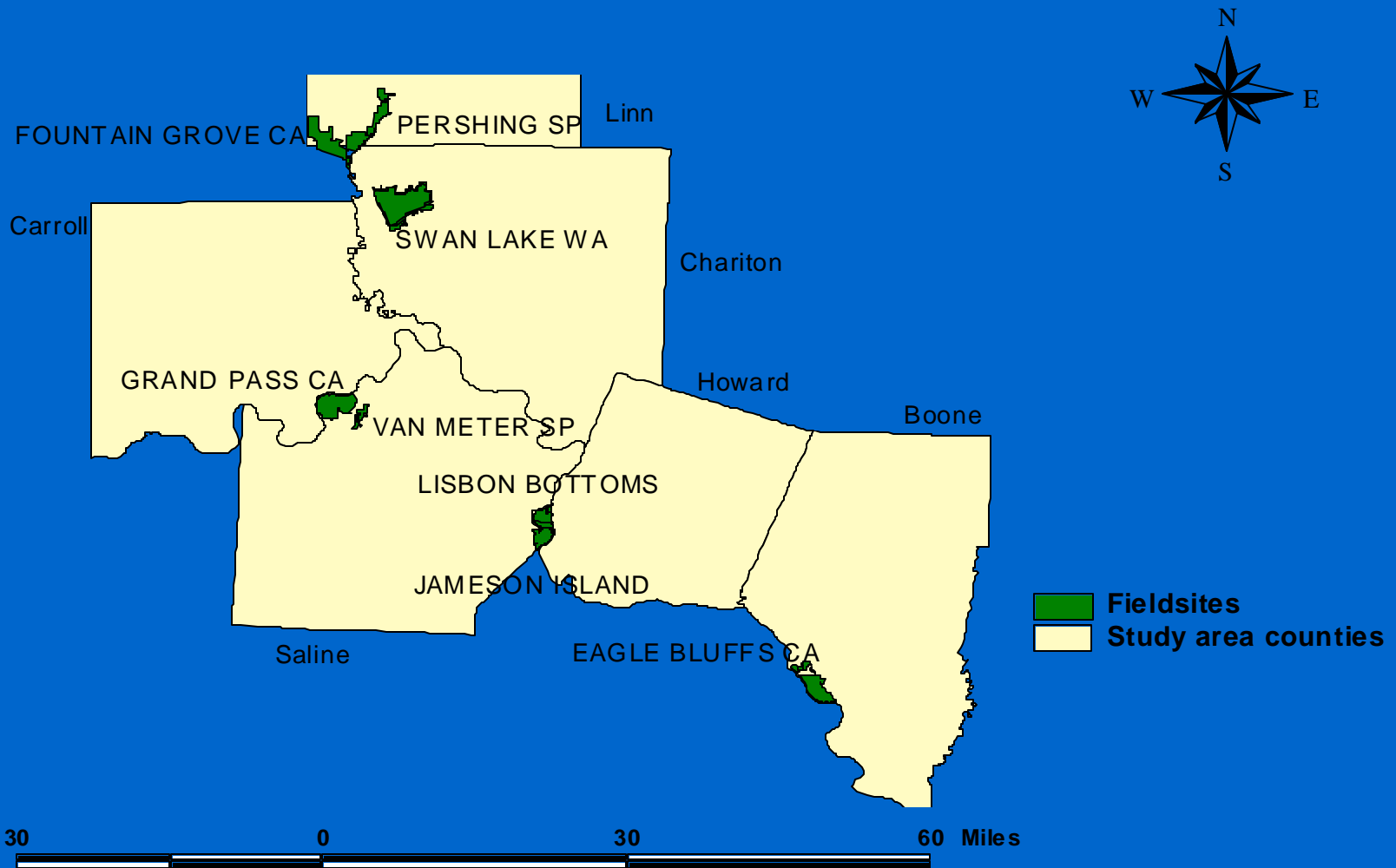
Wetland sites

- Wetlands range from highly managed (MDC) to more “natural” (DNR Parks, F&WS).
- Must balance between homogeneous wetland areas and those that exhibit heterogeneity.

Study area location



Study area



•
•
•

Field Methods

- Utilized areal photos, soil/NWI maps, and expertise of local managers for potential wetland areas.
- Field work began by locating potential wetland sites.



-
-
-

GPS data



- GPS coordinates were collected for each study site and then downloaded into a GIS data base.
- This would give us exact locations when viewing the imagery

•
•
•

Wetland delineation



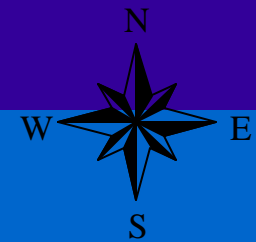
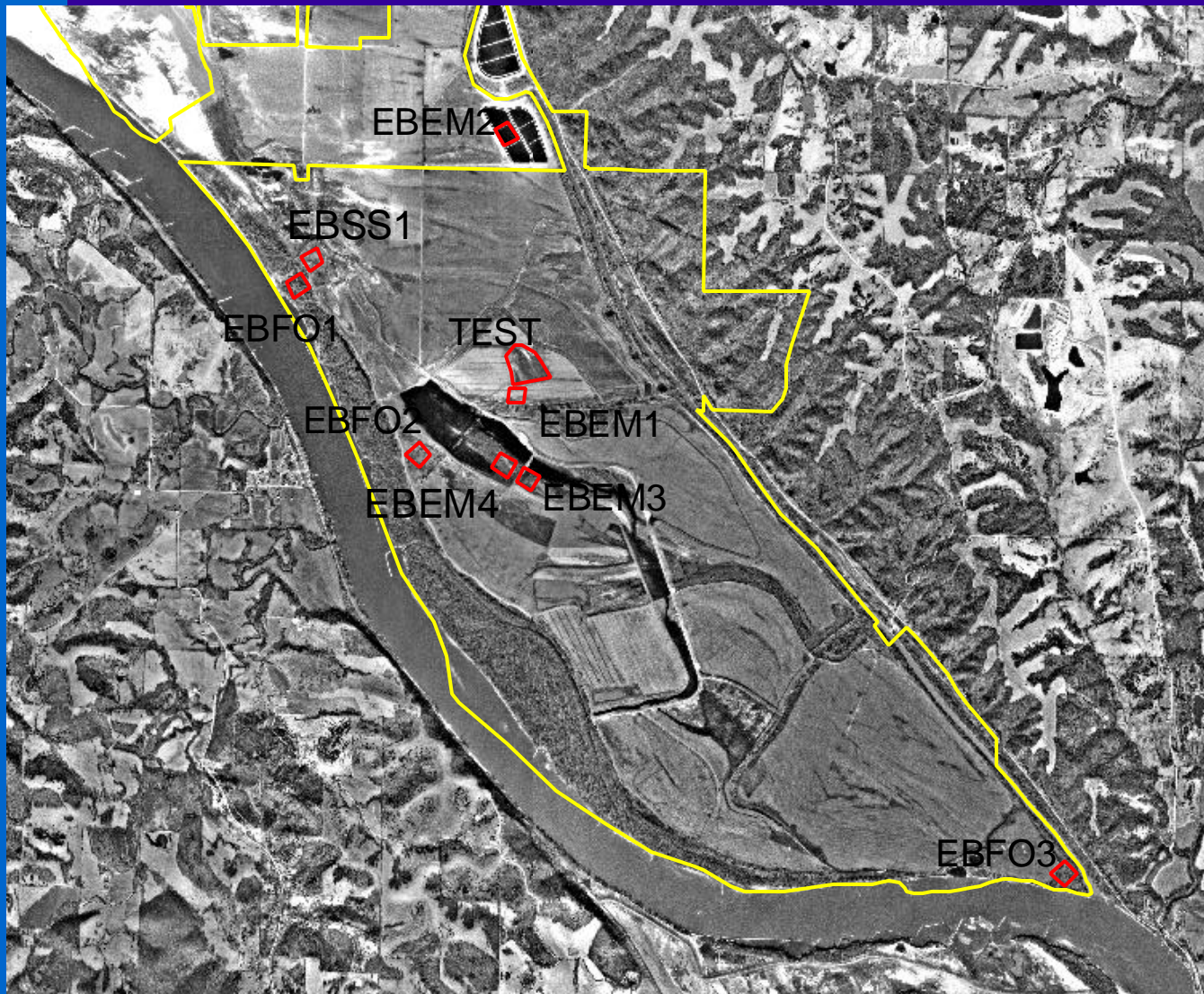
- Wetlands were delineated according to the 1987 ACOE Wetland Delineation Manual
- Wetland type and dominant species were noted and recorded.
- This data then put into a GIS

• • • • • • • •

-
-
-



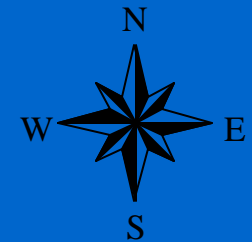
Eagle Bluffs



-  Delineation Sites
-  Area Boundary



Van Meter State Park



-  Delineation sites
-  Park boundary

0.5 0 0.5 1 Miles

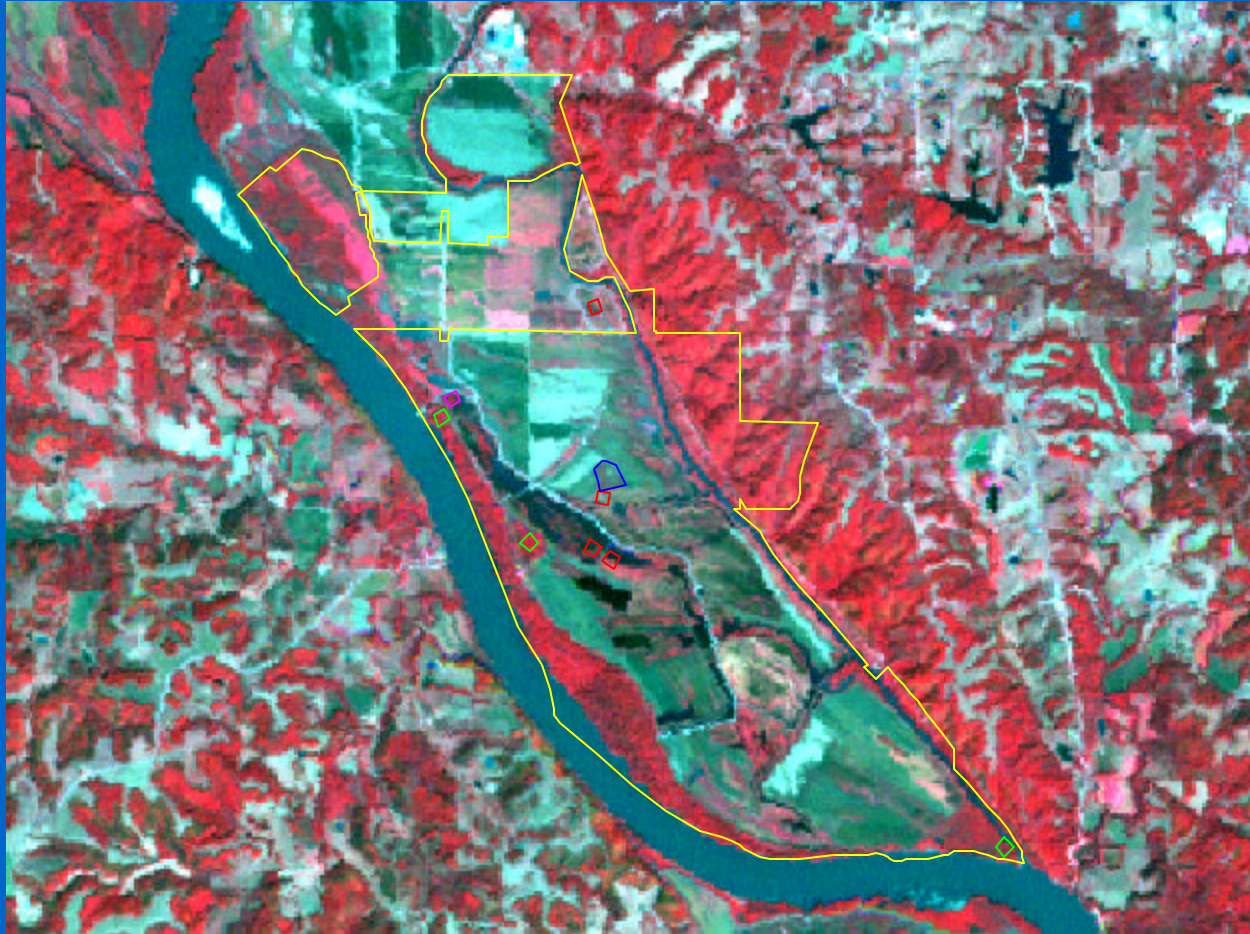
-
-
-

Image platforms

- We will obtain 4 types of imagery:
 - TM 7 - 30m x 30m resolution
 - 15 meter panchromatic
 - SPOT - 20m x 20m
 - IRS Indian - 5m x 5m
 - IKONOS - 1m x 1m

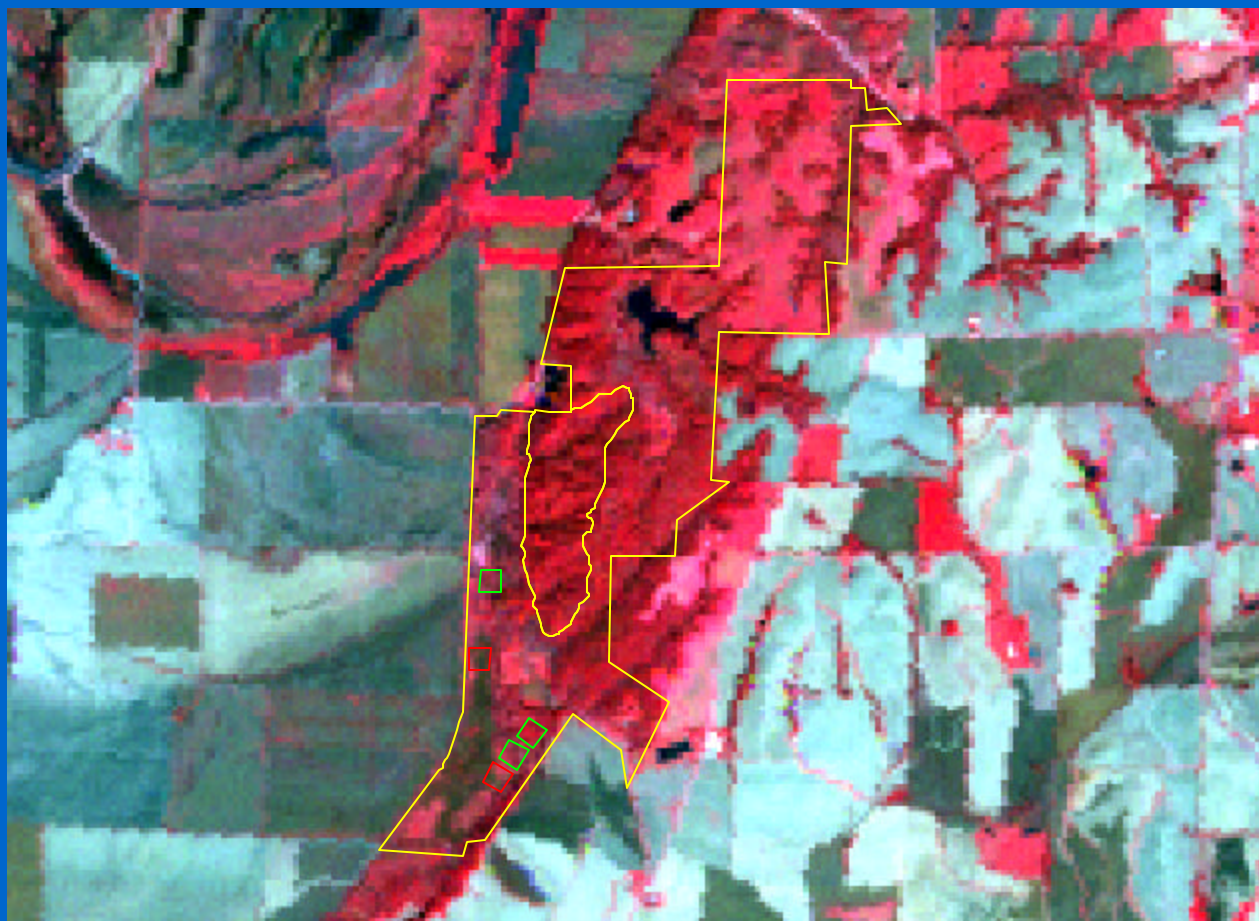
-
-
-

TM Landsat 7 (30m)



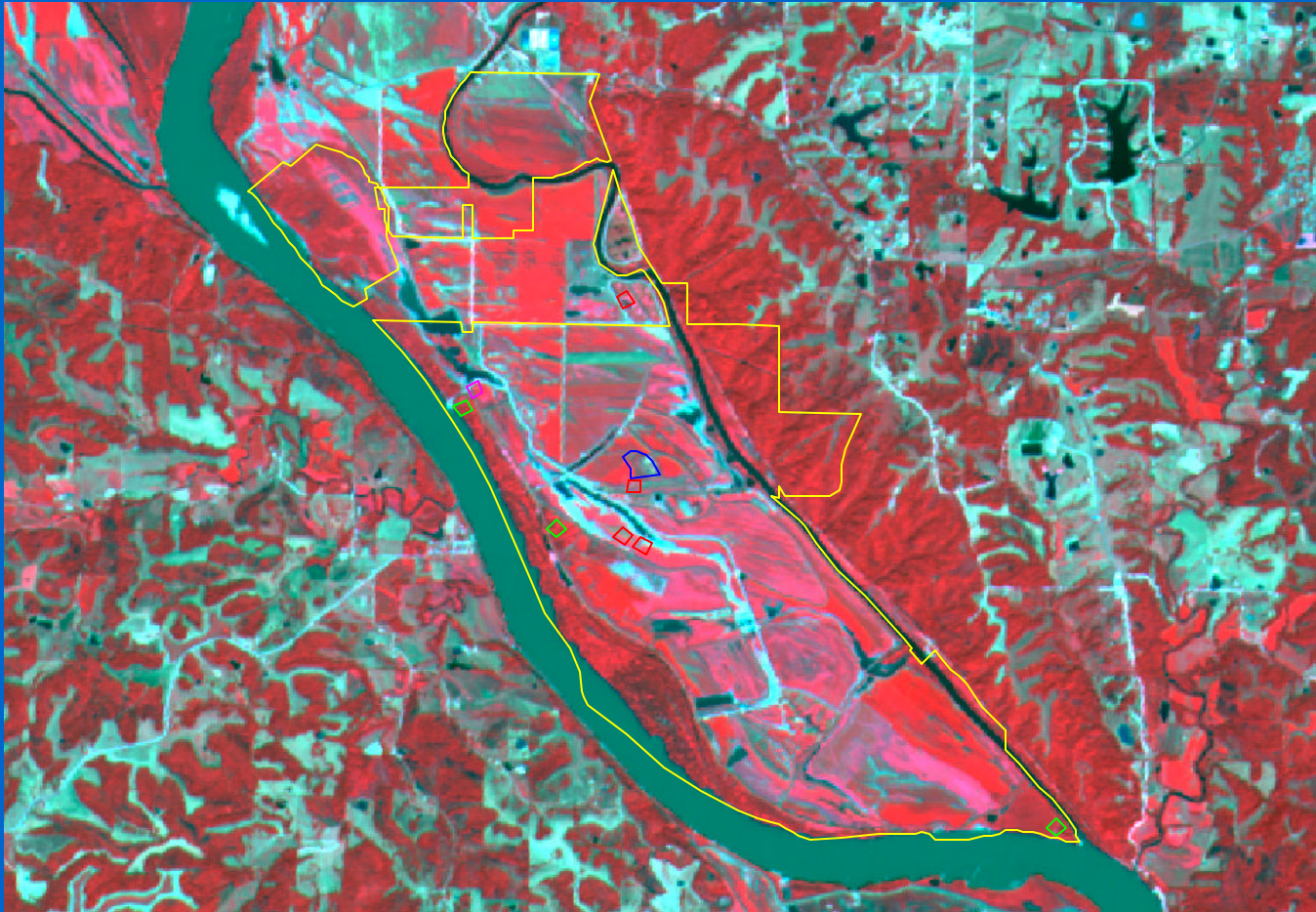
-
-
-

TM Landsat 7 (30m)



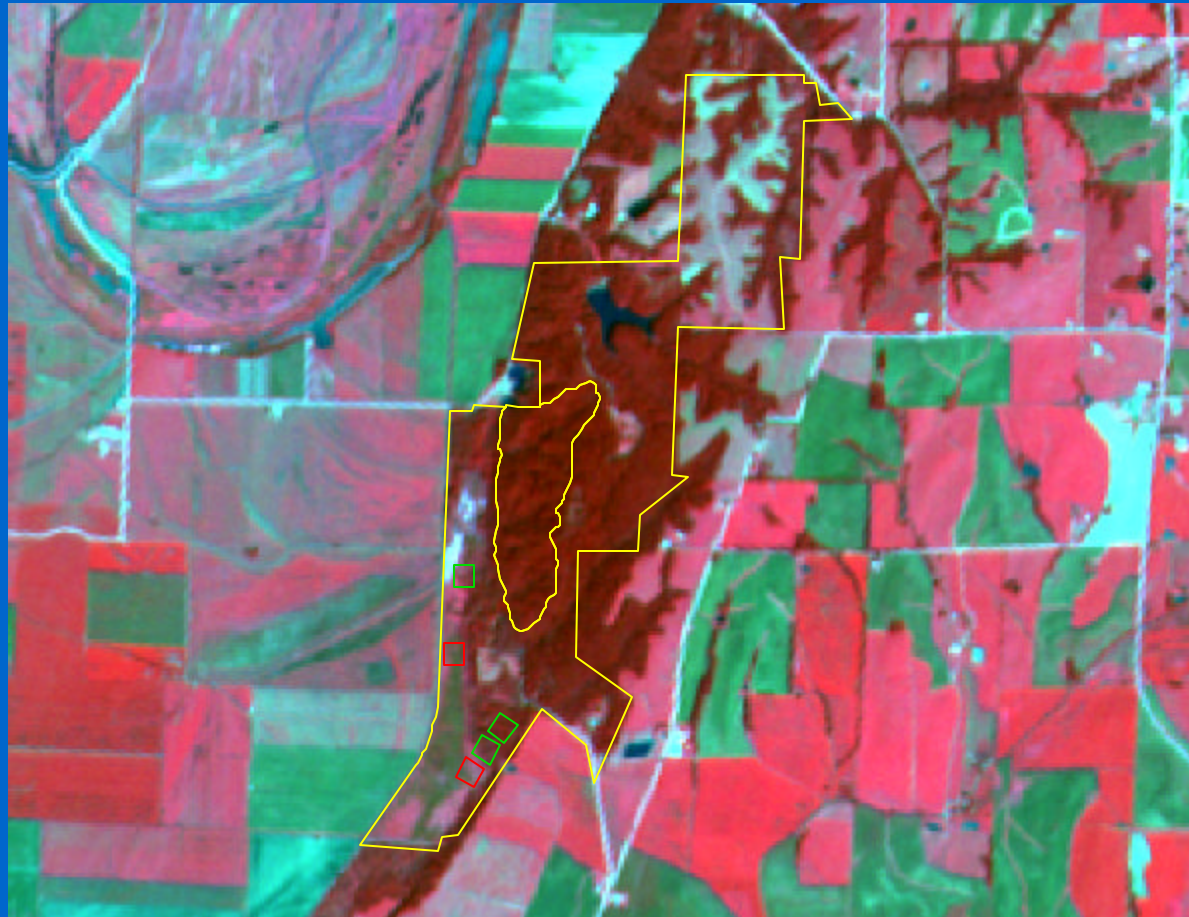
-
-
-

SPOT (20m)



-
-
-

SPOT (20m)



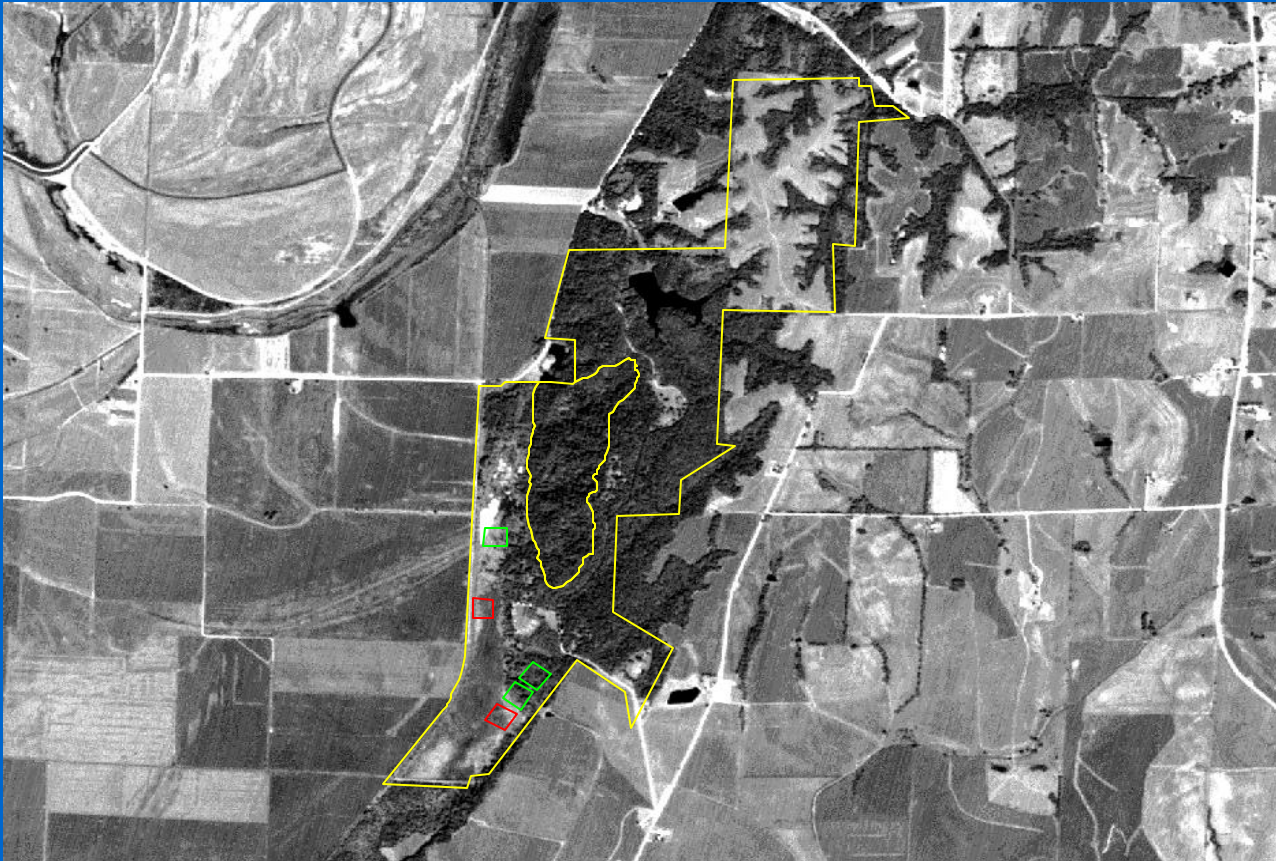
-
-
-

IRS Indian (5m)



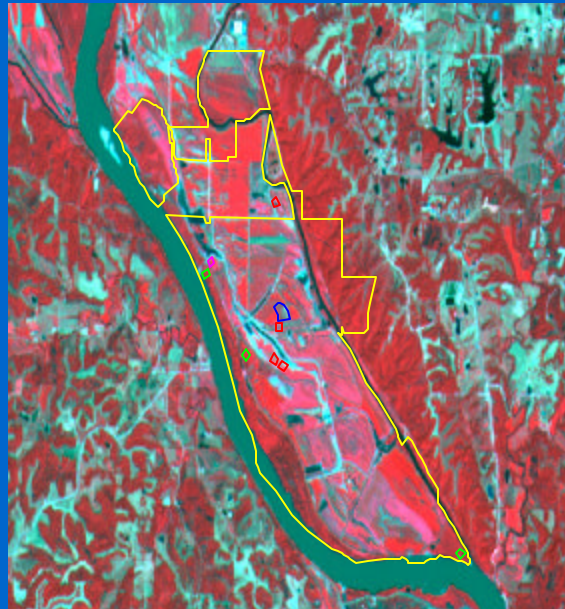
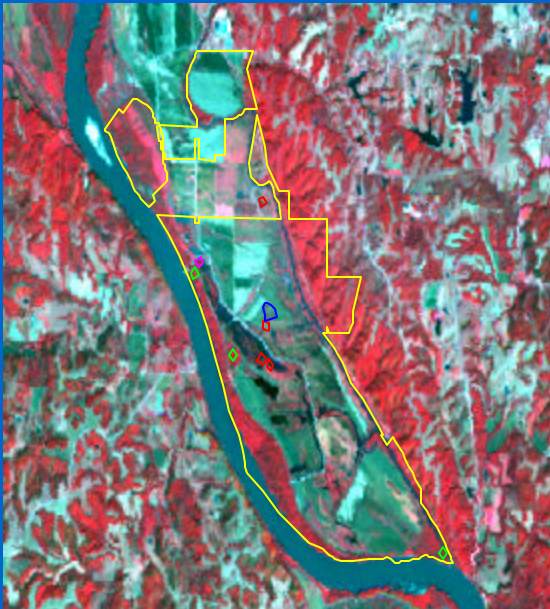
-
-
-

IRS Indian (5m)



-
-
-

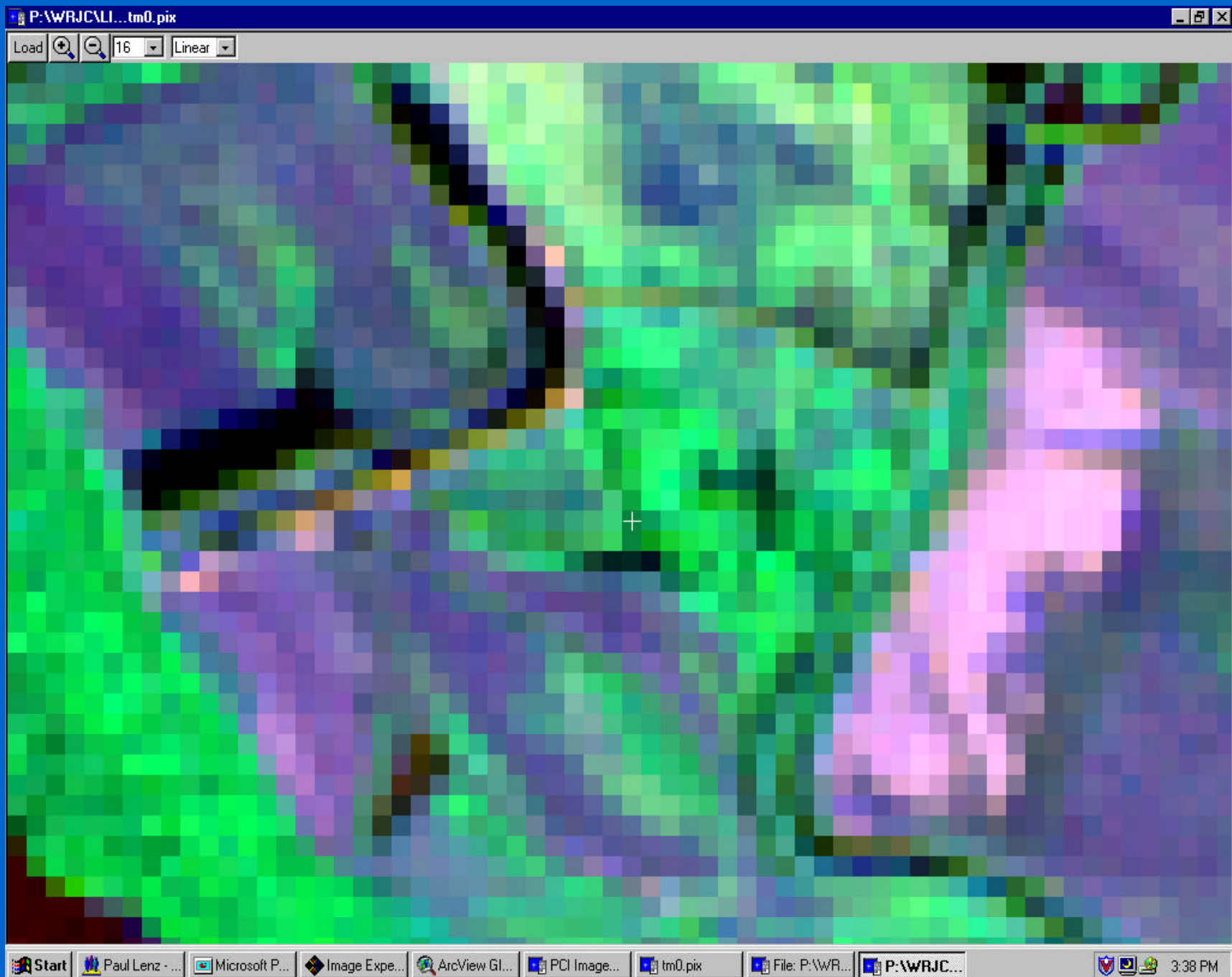
Landsat, SPOT, IRS



•
•
•

Image processing

- We now have the necessary field data to begin image processing.
- We will overlay our study sites on the image and choose pixel by pixel the areas of wetland
- These pixels will then be used to “train” the software.
- The software will search other areas for similar “values”.



•
•
•

Accuracy assessment

- Once the software identifies wetland types, we will field check these.
- Coordinates will be obtained from the GIS of possible wetland areas
- We will the use a GPS unit to find the exact location on the ground

•
•
•

Continued.....

- We will then note whether the software correctly or incorrectly identified the wetland type, perhaps also noting dominant vegetation.
- If error is too large, we will need to retrain the software

•
•
•

The Future??

- Results could be used for a statewide inventory of wetlands.
- Managers could use remote sensing to see the effects of wetland management over time.
- Track wetland loss/change.
- Locate possible mitigation sites

•
•
•

Thanks!!!!

- Thanks to MDC, USF&WS, DNR State Parks for allowing access to study sites.
- Also, thanks to EPA Wetland Staff, MoRAP, and the DNR Water Resources Program.
- See poster display more further information also!

•
•
•

Contacts/Questions??

- MoDNR/GSRAD/Water Resources Program
 - mowaters@dnr.state.mo.us
 - 1-800-334-6946 Option 6



• • • • • • • • • •